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Sustainable Cities: Challenges of an Integrated Planning Approach

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SUSTAINABLE CITIES: CHALLENGES OF AN INTEGRATED PLANNING APPROACH

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February 1995

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ABSTRACT

This paper will **identify** specific **planning** conditions that arise when **planning** aims at sustainable development. First, attention will be paid to **socio-ethical** attitudes toward sustainability issues and to the reasons why much of the sustainability debate deserves an urban focus. Then, specific planning conditions will be discussed in relation to cities, such as a multiple actor situation, inertia in urban adjustment processes, and a segmentation in planning institutions. Furthermore, the paper will focus on economic **behaviour** in urban areas using urban **sustainability** as a broad frame of reference and emphasizing an increasing competition between cities. Then, attention will shift to urban policy in the field of environmental quality control (urban ecology).

A necessary condition for the development of **an** integrated planning for urban sustainability is the development of urban environmental data systems. Attention will therefore, focus on the so-called CBD **structure** of such information systems (Core • Basic • Distinct data) and the key factors for the success of such systems. The paper proceeds with a discussion of particular data needs in view of Environmental Impact Assessment. The **paper** will conclude with the essentials and challenges of an integrated planning approach, major obstacles to such an approach, and an inventory of directions where some progress already has been achieved.

1. SUSTAINABLE DEVELOPMENT

In recent years, “Sustainable Development” has become a popular term, in policy circles as well as the science community. The political formulation of this notion is most clearly described in the Brundtland Report “Our Common Future” (1987) as follows: . . .” a process of change in which the exploitation of resources, the direction of investments, the orientation of technological development and institutional changes are made consistent with future as well as present needs” . . . (p. 46).

Concern about resources, quality of life, etc., in the Western world is however, far from new. It dates back to the early **1960s**, in which the seminal book by Rachel Carson (*The Silent Spring*) (1962) **attracted** strong attention by describing the extensive damage to the environment caused by chemicals and industrial processes. The book has put an emphasis on the pervasiveness of environmental risks by focusing on the chemicalization of the food chain.

The idea of sustainable development is clearly much broader than environmental protection. Furthermore, sustainable development is not a predetermined end **state**, but a **balanced and adaptive evolutionary process** (Nijkamp and Perrels, 1994). Sustainability refers in this context to a balanced use and management of the natural environmental basis of economic development. An essential underlying principle may be that the stock of natural resources should not be depleted beyond its regenerative capacity.

The notion of **sustainable** development clearly suffers from a lack of **operationalization**. At the same time it is increasingly evident that there is no unique definition of sustainable development, and that the interpretation of the concept is strongly dependent upon the particular perspective of specific actors. This favours the development of an operational model which incorporates various scientific and cultural perspectives in an integrated fashion (**RIVM**, 1994).

An awareness of the (social) costs of global environmental impacts does not automatically generate a behavioral change compatible with the sustainability paradigm. The significant gap between recognized **socio-ethical** necessities for behavioral change and actual **socio-economic** decisions or behaviour by actors or

groups, is named the **"social dilemma"** (cf. **Nijkamp**, 1994).

From a socioethical perspective, four ideal-typical modes of behaviour can be distinguished (Norton, 1987):

- Exploitationism** : there is an emphasis on exploitation (cultivation) of land and nature based on a 'colonial' attitude, i.e. a short-term maximizing of profits.
- **Conservationism: there is an** emphasis on a long-term profit maximising use of land and nature based on a preservational, but anthropocentric environmental attitude.
- Eco-preservationism: the** focus of this attitude is on long-term stability of eco-systems based on a joint interest of man and nature.
- Deep eco-preservationism:** the focus is on absolute priority for ecological and environmental values, now and in the future.

It seems plausible that of these four **socio-ethical** modes the exploitation& attitude will fail to pass the test. It has not only caused short-term revenues but also long-term structural costs, for example, soil erosion. Quite some empirical evidence on the incompatibility of exploitationism with sustainable environmental development can be found in our history, e.g. various **destruction** of civilizations which did not respect environmental resource bases. Long-term survival seems to be based on two factors: the stock of available scarce resources and the human creativity in using these resources. The social dilemma is however, a serious impediment to sustainable environmental development.

Sustainable development has of course a global dimension but there is clearly also a close mutual interaction between **local and global processes**. Cities or **city-**regions are open systems impacting on all other areas and on the earth as a whole. It has to be added that in an open spatial system cross boundary flows of resources and even of pollution and waste play an important role: **insustainability** may be imported or exported. Therefore, sustainability requires a conception and spatial scale of analysis that accounts for the openness of urban areas (cf. Breheny, 1992).

Especially in the European context, the reinforced focus on the city seems

warranted, as the European cities are facing a stage of dramatic transformation as a consequence of the move towards the completion of the **internal** market. There is **both an increased competition between** cities within the European community and between European cities and cities in other economic blocks in the world. However, the aim to make European cities more competitive in economic terms may be at odds with the **aim** of environmental sustainability.

The recognition that much of the sustainability debate has an urban focus is also based upon the fact that large cities are the major consumers of natural resources and the major producers of pollution and waste (cf. Girardet, 1992). Cities impact upon regional systems through river catchments and flows, patterns of land use and stresses on- surrounding rural areas. The role of cities in the debate is even greater when we recognize that cities are also the major sources of new **technology** and economic growth.

When conceiving the city on itself, the city provides for human needs and wants, enables qualities and options of human life, and develops particular relationships between planning, design and service level and human behaviour and welfare. Accordingly, the city should be seen as a dynamic, interconnected and complex system. In the past years, it has particularly been recognized that in **thinking** about the urban environment, an isolated approach should be abandoned. In this vein, the Green Paper of the EC (1990) has advocated a holistic view on urban problems and an **integrated** approach to their solution.

An integrated planning approach to urban sustainability has moved away from the splitting up of problems into isolated themes, functions (sectors, actors) and spatial scales. By conceiving environmental problems in their context and complexity, planning for sustainability aims at capturing as much as possible of cause - impact chains and interrelationships between such chains in order to solve these environmental problems.

2. URBAN SUSTAINABILITY AS A DEVICE FOR URBAN POLICY

Sustainability in an urban setting describes the potential of a city to reach qualitatively a new level of **socio-economic**, demographic and technologic output, as well as environmental conditions which in the long run reinforces the foundation of the urban system. Sustainable cities are cities where **socio-economic** interests are brought together in harmony (co-evolution) with environmental and energy concerns in order to ensure continuity in change.

Urban change is the result of internal and external responses by various actors (**institutions**) in cities. Urban **policy** is undertaken in a **multiple-actor** situation, encompassing both the private and public sector. The various urban actors may have different or even conflicting aims on the short term, or they may misunderstand each other due to different vocabularies (or disciplinary backgrounds). This situation is based on the various sectors involved such as production, housing, **traffic**, leisure and water management. Aside from sector based differences between policy actors, there are also **territorially** based differences, such as between policy actors in central cities and policy actors in suburbs dealing 'with different urban costs and benefits. It has become apparent that cities and counties often plan in an isolated and **unco-ordinated** approach.

A common element of urban change processes is inertia (or lack of resilience) in adjustment mechanisms. This inertia may further contribute to an increased **unco-ordinated** behaviour in various types of urban policy, such as **infrastructure** policy and industrialization policy. For instance, the interaction between the production system and a given **infrastructure** system requires adjustments which are close to be instantaneous, given the capacity **constraints** that prevail at each point in time and space. Changes of the capacity **constraints** and relocations must however, be filtered through a time consuming decision process. Hence, investment and relocation decisions are often delayed in relation to observed warning signals representing under- and overutilization of existing amenities in the urban system.

Urban policies for **sustainable** development suffer from serious obstacles. Although **sustainable** urban development has become an important issue in social (policy) science research, the theoretical underpinnings and the critical success

parameters of actual urban sustainability policies are still feeble. In addition, there is **still** a shortage of a **multiple field** approach to urban sustainability, which combines the various different actors, their activities and institutions, their contribution to economic growth, as well as their resource consumption and negative external effects. Moreover, **sustainable** development is a process that takes a long time. Over time positions of power and ideas may shift, leading to even more complications.

Now the question is: how can urban planning policies be used in order to contribute to an urban sustainable development? How can solutions be derived for urban congestion problems, for a shortage of quality of life, and for an enormous (hidden) unemployment? To what extent can problems in one field be solved without causing problems in other fields? How can effective instruments be applied? Serve these instruments only environmental-technical aims or are they also related to the origins of causal chains?

An important question in this respect is whether policy is designed only on the operational (or instrumental level) or also on the strategic level. Strategic governance aims to change the context of policy processes in such a way that governance on the operational level will be easier (cf. De Bruijn and Ten Heuvelhof, **1994**). Thus, the chances for a successful approach to environmental problems will be enhanced when policy interventions take place not only on the instrumental level but also on the strategic level.

In the next section, we will discuss economic behaviour in urban areas using urban sustainability as a broad frame of reference. Then, we will turn to urban policy in the field of environmental quality control (urban ecology) (Section 4). A necessary condition for the development of an integrated planning for urban **sustainability** is the development of urban environmental data systems. Section 5 will discuss the architecture of such information systems and the key factors for their success. The paper proceeds then with a discussion of particular data needs in view of Environmental Impact Assessment (Section 6). The paper will conclude with the essentials and challenges of an integrated planning approach, major obstacles to such an approach, and an inventory of directions where some progress **already** has been achieved.

3. URBAN ECONOMIC DYNAMICS

An indigenous feature of cities is their ‘struggle for life’, in the sense that their final **aim** will **be** to survive. The aim of continuity is however, not a random phenomenon. It is to be based on competitive (regional and national, as well as increasingly **international**) markets. Total demand on these broad markets is more or less given, and hence the only possibility of an urban system to attract a maximum market share is to be as competitive as possible. In many cases this may require a continuous restructuring of the economic, environmental, industrial and technological base of the city. Thus, spatial-economic competition is a basic feature of urban dynamics: the **more** competitive an urban ‘species’, the **higher** its survival chances. Consequently, competitive behaviour of cities has to be seen as a rational decision-making process, in which the decision-making actors are inter alia in the business sector, the public sector, the public at large, etc.

Urban (or metropolitan) regions are essentially large production and information processing systems, encompassing the core economic activities of a country and acting as the focal point of interurban, regional or national networks. Their evolutionary paths do not only reflect stages of fast growth and stagnant maturity, but also obsolescence and decline.

Currently, we face a major change from an economic system based on mass manufacturing of uniform products, division of **labour** and hierarchical control, to a system based on **flexible modes of production**, leading to a **network economy**. At the same time, we observe a shift to a ‘knowledge’ economy, in which competitive advantage is increasingly based upon access to new knowledge and creativity. These transitions **include** a competition between ‘old’ locations of production grown upon local availability of natural resources, access to complementary resources and output markets, and ‘new’ locations. These ‘new’ locations seem to be different in that they are much more focused on accommodating and attracting creativity and **knowledge**, by providing education of cognitive skills, creative organisations, including various cultural facilities. Such cities or smaller towns provide also, almost invariably, modern communication, including high speed rail road and large capacity telecommunication (Andersson, 1991). The shift towards a network

economy and knowledge society is only one change in a long sequence of changes that have affected the location and evolutionary path of cities.

A further megatrend needs to be mentioned here. The recent European Unification and its unprecedented elimination of borders have paved the way to a free movement of people, capital, goods, and information. In addition, Eastern Europe has opened its borders and looks toward integration with a new Europe. Vanishing borders however, do not automatically imply a beneficial development for all cities involved. Vanishing borders also mean the opening of urban economies to many new social, economic and political influences, introducing an increased competition between cities in view of their economic power (Cheshire and Gordon, 1995).

The above indicated development has caused a renewed economic competition between cities and a potential move away from ecological conditions to economic growth. Moreover, the new production processes themselves may also have advanced a move away from environmental concern. The trend for de-integration and fragmentation, as well as Just-in-Time production may have led first to an increase in transportation and secondly, to an impediment to the introduction of environmental protection measures in production processes. It is for example, an intriguing question to what extent these economic trends can be (made) compatible with environmental needs for an integrated materials-product-chain management. **On** the micro level, it can be stated that individual firms may increasingly feel responsible for the damage caused to the environment. However, a cleaner or more sustainable production does not represent an objective per se within firms. Different from other types of innovation, cleaner production innovations will generally have a negative impact on the **firm's** competitiveness and profits, although there may sometimes be compensation by savings in inputs and waste disposal costs. Given these **circumstances**, the decision to adopt cleaner technologies depends heavily on government regulation, particularly the extent to which this regulation can offset obstacles to adoption, such as higher costs, but also unfavourable technical features and lack of knowledge (uncertainty) (Kemp and soete, 1992).

A dynamic urban economic system is facing specific characteristics which affect its potentials to ensure the maintenance and improvement of the technology and market position of economic actors (Nijkamp, 1990). These characteristics can be

summarized as follows:

A limited carrying **capacity**. **This is concerned** with land and resources (physical and human).

Multifunctionality. **This** leads to the benefit of various activities from each other within the urban territory (urban symbiosis). It strongly influences the incubation potential and underlying local learning processes.

Interaction and communication networks. **Through these** networks a city-system is linked to other cities or' regions. This characteristic affects for example, the potentials for adoption of new technology from elsewhere and the potentials for development of new output markets.

The above characteristics clearly offer various possibilities for an urban policy aimed at an improved competitive position. For example, one may focus on the technological production factors, by means of an emphasis on the inputs necessary to generate technological and economic change in the city (such as knowledge and capital). Similarly, urban policy can focus on the improvement of '**seedbed** conditions' of cities (e.g. university research facilities, availability of cheap and flexible incubator housing), and on the improvement of conditions for networking (e.g. meeting points for key economic actors, quality of the traffic **infrastructure** and telecommunication).

It is commonly acknowledged that in advanced economies, metropolitan centres but also other metropolitan areas tend to lose a part of their innovation and incubation potential in favour of outside areas (**Davelaar** and Nijkamp, 1992; Van Geenhuizen and Nijkamp, 1993). Such an outward shift seems to be partly the result of the rise of (new) **bottleneck factors** in metropolitan centres. In the Netherlands, these seem to involve specific **labour** market shortages (based upon low supply of high-quality residential areas in large cities), and severe congestion in the major urban traffic systems.

It is needless to say that in this context, urban policy has the clear task to improve the economic competitive power of large cities. Such a policy however, needs to be integrated with ecological considerations. The latter considerations will be briefly discussed in the next section.

4. URBAN SUSTAINABILITY AND ECOLOGY

Modern urban systems are increasingly faced with environmental problems, ranging from air, soil and water pollution to intangible externalities such as noise annoyance, lack of safety, destruction of 'cityscape', or visual pollution. There is a wide variety of sources generating these urban environmental problems, such as demographic factors, **socio-economic** development, inefficient energy consumption, spatial behaviour (travel) patterns, and most important of all, inappropriate and/or badly enforced urban environmental policy measures. An improvement of the current unfavourable situation requires clearly a mobilization of all forces.

In the meantime, even a new discipline has arisen, called **urban ecology**, which aims to design principles for sound urban environmental policy. Examples of such principles are:

- minimize** space consumption in urban areas (e.g. underground parking)
- minimize** spatial mobility in cities by reducing the geographical separation between working, living and facility spaces
- **minimize** urban private transport
- favour the use of new information and telecommunication technology
- **minimize** urban waste and favour recycling
- **minimize** urban energy use (e.g. combined heat and power systems, district heating etc.)
- favour the adoption of ecologically sustainable life styles (by means of education, promotion of ways to such life styles, and perhaps also incentives).

The above principles are somewhat comparable to those formulated in the so-called 'Gaia' - concept (see Lovelock, 1979). The **fulfilment** of such principles will of course require an effective urban policy, which is **multifaceted** in nature and covers a great many aspects of current city life.

An interesting **illustration** of concrete attempts at achieving **sustainable** cities can be found in the Danish 'Green Municipality Project' in which various cities in Denmark collaborate with the aim to generate awareness and policy actions at the

local level, in order to pave the road for economically and ecologically responsible development of cities. Various pilot projects have been initiated in the meantime, focusing attention on life styles in the city, health care, education/information, landscape, clean technology, water management, energy policy, transport and built environment.

Besides national initiatives one can increasingly observe international (mainly European) plans where cities wish to cooperate with the main aim to exchange information on experiences (successes and failures) regarding urban environmental policy measures. One of such initiatives is the CITIES (Community Integrated Task for the Improvement of Energy-Environmental Systems in Cities), launched by the Commission of the **European** Communities (EC). Various results and experiences from the CITIES Programme have recently been published (**Nijkamp** and **Perrels**, 1994).

An essential condition for an effective integrated planning using ecological principles is the development of urban environmental data systems. Such data systems aim to deliver precise empirical evidence on urban environmental quality and implications for both households and firms. This will be the subject matter of the next section.

5. URBAN ENVIRONMENTAL DATASYSTEMS

An effective policy and planning system in view of urban sustainability clearly needs a system of **suitable indicators**. **Indicators** of urban sustainability are still in the process of development, among others dependent upon the current policy views and the definition of **sustainability**. For example, a **major** point of political divergence is the conceived relationship between economic growth and sustainable development (cf. Haughton and Hunter 1994). 'Deep ecology' writers stand at one extreme in adhering a total incompatibility between continued high levels of economic growth and advancing of a **sustainable** environment. At the other extreme are those who believe in the **abundance** of nature and the ingenuity of mankind in finding new solutions to newly emerging environmental problems. In the latter view, economic

growth becomes necessary to **sustainability**, as it alone can provide the financial and technological capacity **required** for solutions of environmental problems.

The development of suitable indicators for urban sustainability is also dependent upon the amount of knowledge available on **sustainability** issues. It should be emphasized that there is still a lack of knowledge regarding the systems and mechanisms in the natural environment, and the human (behavioral) causes behind environmental problems. For example, there is still much uncertainty about threshold values (and tolerances) in natural systems, such as the (concentration) values above (or below) which the regenerative capacity of natural bodies will decrease. Similarly, it is largely unknown which indicators in urban natural and **socio-economic** systems can serve as key parameters describing the qualitative condition of these systems.

Some progress in the development of urban environmental data systems has nevertheless, been made in recent years. In Berlin for example, the so-called Environmental Atlas of **Berlin** has been designed and implemented. It pays attention to the following components of the environment: soil, water, air, climate, biotopes, land-use, traffic and noise. Regarding soil, the data system includes among others information on contaminated sites, topography, lead and cadmium in soil and plants, and radioactivity. The implementation of the atlas is clearly not intended as a value-free activity. It aims to serve as a basis for an ecologically oriented urban planning system, by highlighting existing environmental problems in the city, for example, the location and scale of environmental degradation and the exceeding of threshold values.

Urban environmental statistics can be subdivided according to the major bodies in the ecosystem, namely water, air, soil, and also green area (forest). Particular attention can be given to the burden on the environment, mainly the discharge of waste water, emissions of pollutants into the air, and the generation of waste materials. In addition, statistics can be included on the concentration of pollution in various bodies and on measures to restrict the burden.

It should be emphasized that much environmental expertise is needed to translate source information on environmental pollution (i.e. emission) into ambient concentration at those objects or subjects exposed to risk (i.e. immission). This requires quite some technical **modelling** expertise on the distribution patterns of pollution. In addition, much information is needed to translate immission of pollution

into various **social** cost categories associated with for example, human health. Accordingly, the following chain has to be assessed:

(cause) emission --> immission --> impacts

This holds true for all categories of pollution, such as air, water and soil pollution. The chain approach clearly leads to a large need for data on urban environmental sustainability.

It seems likely that **statistical** sources for environmental data are very dispersed. In the Netherlands for example, data on water quality and water discharge are mainly collected by the so-called Water Boards, whereas data on the air are mainly collected by the Netherlands Department of Environmental Protection and the Netherlands Organisation for Applied Scientific Research (**TNO**). Similarly, both municipalities (regarding households) and the Dutch Central Bureau of Statistics (regarding **firms**) are involved in data collection on solid waste production. It seems wise therefore, to establish a board on the level of the city administration in order to integrate and coordinate data collection on urban environmental sustainability.

Most factors that influence the success of urban data systems are related to consistency between data use (demand) and data collection as well as processing (supply). In addition, consistency is also very important between the different data collecting actors. Aside from the compatibility question regarding hardware and software, the issue of consistency involves four characteristics of information systems, namely:

- (1) Coverage of the planning fields by the data.
- (2) Uniformity in the definition of units and their attributes,
- (3) Uniformity in the level of aggregation.
- (4) Similarity of codes and symbols.

Regarding **coverage** of the planning fields, it is very important that the data covers the subjects in sufficient width and depth (detail). In addition, when the planning field includes attributes which are 'latent', such as quality of life, the

variables in the data base should be valid indicators. A further important aspect is the statistical validity of the data. This matters when sample surveys are used as data sources but also when registration with complete coverage is at hand. Problems of statistical validity may particularly rise when there is a large non-response in surveys, and a large amount of 'hidden' events (non-registration) in registration.

A further important issue within the framework of consistency is concerned with the **definition** of spatial and non-spatial units, and their attributes. For example, the definition of city-regions (and spatial subdivisions) in the data system preferably corresponds with the spatial units in planning. Similarly, attributes such as green area and contaminated grounds, should be **defined** in a uniform way. It is also advisable to collect and process data at the lowest **level of** aggregation possible. When aggregation is necessary, consistency in the method used is to be preferred. This is particularly true for spatial levels and time periods, but also for economic sectors, etc.

The final aspect of consistency to be mentioned here is concerned with the use of codes and symbols by the different data producers and users. A sufficient level of **similarity** in this use is necessary in order to transfer and integrate data from different systems in a smooth way.

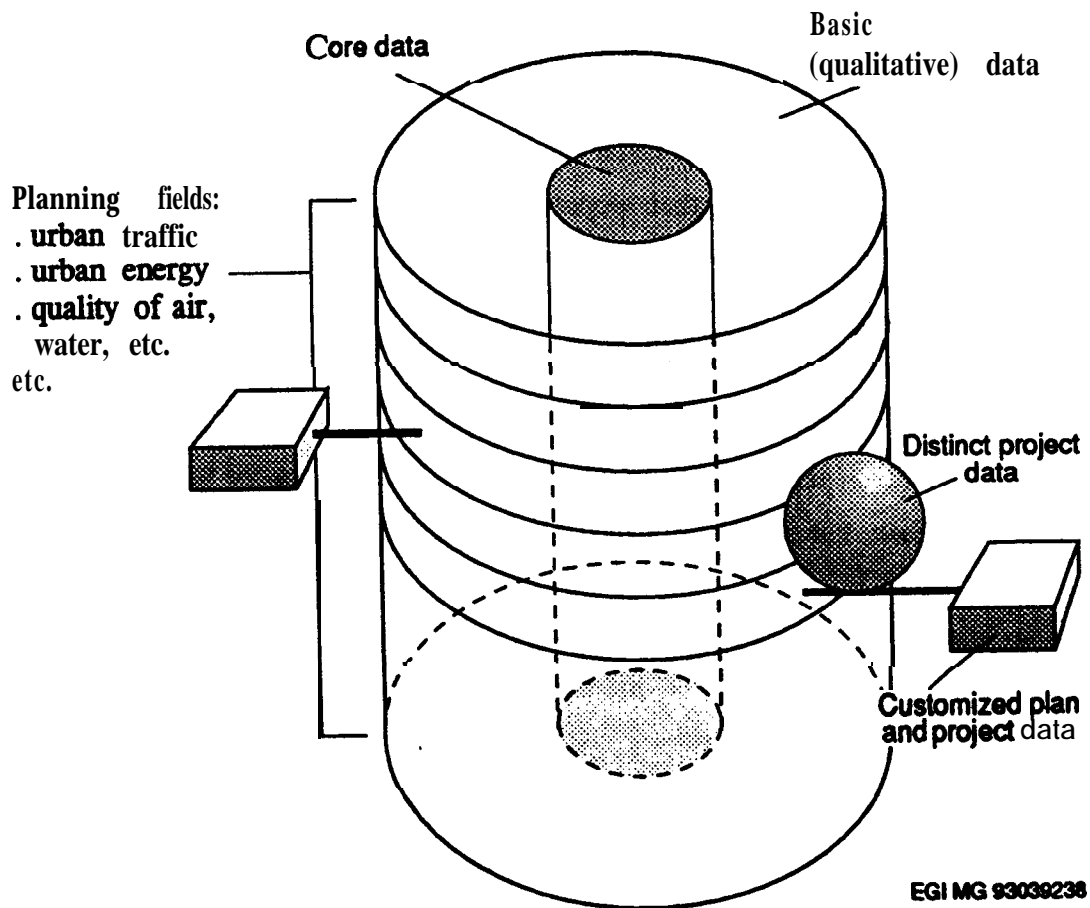
An urban environmental data system provides indicators on the state and change of the urban environment, (per capita) state of habits of the urban population and change in these habits, as well as indicators **measuring** the way in which cities cause environmental problems and suffer **from** such problems (the chain approach). In addition, it provides data which are directly helpful in the design and implementation of an urban environmental policy. One more step is to **include** data on the social **well-being** of the urban population. An urban environmental data system within the framework of **sustainability** policies, may be structured as follows (Figure 1):

Core Indicators: these provide the minimal essential information to measure urban **sustainability** quantitatively and cover high priority policy fields.

Basic Indicators: these support core indicators in a qualitative sense, and provide quantitative and qualitative information on relatively low

priority policy fields (which may lead to causal insights into core issues).
Distinct Project (Am) Indicators: these are concerned with urban sustainability in terms of specific projects (such as in **Environmental Impact Assessment (EIA)**) and particular areas where specific (non generic) sustainability problems and conditions are observed.

Figure 1 **Architecture of an urban environmental data system**



Despite the lack of a uniform definition of sustainability and a shortage in **knowledge** on sustainability processes and mechanisms, a set of **criteria** can be established in view of the design of urban sustainability indicators. The criteria are concerned with the scope of the indicators and their policy function. In view of core data, urban **sustainability** indicators cover preferably high priority areas of environmental sustainability (including the chain approach), as follows:

Consumption of water, energy (including gasoline) and raw material by the urban population and industry.

Urban production of water and air pollutants, solid waste, hazardous waste and radiation.

Quality of urban air, climate, water bodies (e.g. lakes and coastal zones), soil, ground water, and vitality of urban green (parks, forests).

Capacity of the urban population and industry to contribute to environmental sustainability (such as production of renewable and clean energy, recycling and removal of waste material, eco management and auditing in companies).

(In a further step towards an integrated approach) Human well-being, such as indicated by physical health and quality of life (poverty levels, crime, car traffic accidents, urban socio-cultural activities, etc.).

In addition to coverage, a further six criteria are important in view of all types of indicators (core, basic and distinct). Urban **sustainability** indicators are preferably:

Directly measurable in an unambiguous way, leading to a consistent quantitative data system (only core indicators).

Similar to (or at least compatible with) existing practice in **European** cities.

Providing the basis for an elaborate explanation to values measured in high priority **sustainability** areas.

Closely linked to continuous urban **evaluation** and monitoring systems.

A basis for advanced urban policies and urban plans (long term as well

as short term detailed local plans).

An adequate basis for presentation in public information (education).

It goes without saying that the above criteria ask for a cautious selection of indicators to be **included** in urban sustainability data systems, be it core, basic or distinct information.

One major change following from the adoption of an integrated planning approach to sustainability is that environmental objectives are specified at a much **earlier** stage in the planning process. These objectives preferably drive the whole process rather than being included as an after thought (**EU Expert Group on the Urban Environment, 1994**). One of the means by which environmental implications can be considered early in the planning process is Environmental Impact Assessment (**EIA**). This planning tool will be discussed in the next section with a particular focus on its data needs when used in relation to distinct projects.

6. **ENVIRONMENTAL IMPACT ASSESSMENT**

As a proactive policy tool, EIA provides a framework for the prior assessment of the potential environmental impacts of urban (or other) policy development. By using EIA, adverse environmental effects can be eliminated or **minimised** before the development commences (**Haughton and Hunter, 1994**).

EIA aims to increase the quality of policy making and planning by assessing environmental impacts of developments in an integrative way by being explicit and transparent. Nevertheless, various 'subjective' decisions underlie the use of EIA. First, a **prior screening** of policies is **required** to determine whether these policies should be subject to a full EIA **procedure**. The criteria for such screening should strike a balance between environmental protection and unnecessary imposition of a full EIA procedure. When applied to a particular project, screening criteria may include the physical size (scale) of the project, the environmental characteristics of the area in question, and the physical and process characteristics of the project. Secondly, an EIA procedure allows for a prior scoping of potential impacts in order

to identify relevant impact issues to be **included** in the assessment. This scoping is of utmost importance as it directs the (often expensive) collection of data and determines the focus of analysis on those impacts considered to be of most concern. A third category of ‘subjective’ decisions follows on from the opportunity to use a prioritisation in the **valuation** of effects in the **final** assessment. For example, it is possible to assign different weights in the **final** assessment to economic (**cost-benefit**) effects, effects on the environment, and effects on safety of the resident population. In an adequate EIA procedure ‘subjective’ selection criteria and assignment of weights are often based on written expertise and expert consultation, whereas the results are made explicit in written statements.

As currently applied within the European Union, EIA is the assessment of effects of particular development **projects**. However, it has increasingly been realized that such a project assessment in fact, follows the basic policy choices and cannot change the orientation of these choices. Therefore, assessment should be extended to policies, programmes and plans. Such an assessment (**Strategic Environmental Assessment** (SEA)) is preferably **undertaken** as a part of the policy design process (**EU** Expert Group on the Urban Environment, 1994; Haughton and Hunter, 1994).

The adequacy of EIA depends to a large degree on the **quality** of the information used in processing the results on the likely effects of policies and projects. When applied to distinct projects, the information includes ideally (EC Directives) the following:

- (1) Project design and size, particularly effects on human beings, fauna and flora, soil, water, air, climate and landscape, material assets and the built cultural heritage.
- (2) Project site (area) and environment of implementation, particularly the sensitivity of the environment for specific effects (baseline conditions).
- (3) Impact models, forecasting and evaluation techniques, regarding short and long term effects, primary and secondary effects.
- (4) Measures and alternatives that can prevent (reduce) harmful effects.
- (5) Established environmental regulations **and** land use plans which may

affect the project.

All general **matching** (or consistency) problems between demand and supply of data apply to EIA. Of particular importance is the lack of accuracy of impact predictions, mainly caused by shortcomings in the prediction models (techniques) and data on the quality state of the environment (**Haughton** and Hunter 1994). The availability and quality of baseline information on the status of the environment is crucial for making accurate predictions of environmental change. Accordingly, there is a need for reliable and continuously updated **environmental** data on the urban area, to be established as a core data base (as previously indicated in Section 5). From this **permanent** data set, information can then be made available to EIA practitioners and decision-makers in view of distinct projects. In addition, there is a need for **post-development monitoring** of actual environmental impacts, in order to enhance the understanding of environmental processes and tolerances.

Despite the above **inadequacies**, EIA may play a substantial role in the decision making and planning process in urban areas. First, it gives a contribution to the principle of ‘prevention is better than cure’ and ‘secondly, it advances a greater involvement of the local community on decision-making, as well as an increasing awareness of environmental sustainability issues among developers, local communities, and urban policy-makers.

7. AN INTEGRATED PLANNING APPROACH

The need for an integrated (interdisciplinary) planning approach to **sustainable** cities stems from the following basic **characteristics** of the planning subject, planning system and planning process which have been indicated in the previous sections, namely:

- a multi-actor situation
- multiple institutional barriers
- a multi-layer policy and planning organization (local, regional, etc.)

multi-faceted and interrelated policy and **planning** fields
 inertia in urban adjustment processes
 a segmentation within policy and **planning** institutions
 a strong need for the chain approach to environmental problems.

Ideally, an integrated planning approach to urban **sustainability** benefits from the following advantages (cf. EU Expert Group on the Urban Environment, 1994):

The approach operates over a range of spatial scales, related to the levels at which environmental problems arise and at which they cause damages.

It enables to tackle a high complexity.

It **allows** for community involvement, and it is open and democratic in operation.

It seeks to consider future effects and implications on different actors in the urban community.

It enables to find a conscious balance' between economic, social, and environmental objectives, whereas the latter are increasingly used to drive policy and **planning** processes.

Despite major progress in integrated planning approaches to sustainability, it has become clear that the road towards sustainability in urban development is paved with many stumbling blocks. A few caveats in achieving an operational integrated policy for **sustainable** cities will be mentioned here:

- (1) The profile of a 'sustainable city' is not unambiguous as yet, and appears to generate always a lot of political debate.
- (2) As previously **discussed, there** is a shortage of valid indicators and data for the operational measurement of sustainability.
- (3) The measurement of indicators and identification of bottlenecks have seldomly been translated into sustainability policy measures and their implementation.

- (4) The policy sectors to be considered in a **sustainable** city policy (such as industry, transport, energy) may show much variation, for example in growth an institutional setting. This leads towards a diverse response to policy measures.
- (5) Changes in urban land use involving substitution between different activities (e.g. parking place into **office** space) provoke much discussion on the trade-offs between the **socio-economic** and environmental implications and evaluation of such changes.
- (6) Financial budgets of cities impose severe constraints on the flexibility and feasibility of new urban environmental plans.
- (7) Small-scale improvements in the direct living environment of urban inhabitants are often much higher valued than strategic urban development plans. Related to this is the NIMBY (Not in My Back Yard) phenomenon, a particular component of the previously discussed social dilemma (Section 1).
- (8) Transport in the city but also particular **manufacturing** processes appear to lead to many externalities which are however, extremely hard to cope with.
- (9) An integrated urban environmental policy (including the chain-concept starting from source to final impacts) has not yet become a widely accepted idea.

In the light of these observations, it seems that high ambitions meet fierce resistance and therefore, some modesty seems to be **in** place. Nevertheless, various successes in **European** cities can be observed which **certainly** deserve more attention (see Nijkamp and Perrels, 1994). Especially in the field of integrated urban **energy planning** - which is to a large extent forming the basis for urban environmental planning - various noticeable experiences can be **found**. Integrated urban energy planning involves experiences inter alia in the following fields:

urban waste and energy efficiency
transport energy and environment

built environment, energy and environment.

Particularly in these fields, the achieved results point towards the directions and methodology to be used in a **realistic** integrated planning of sustainable cities. It seems a plausible strategy to formulate and propose urban energy/environmental initiatives with the following statement: the promotion of an effective and efficient urban energy/environmental policy aiming at (1) a maximum feasible reduction in all forms of direct and indirect energy consumption in cities, and **(2)** a rational choice of urban environmental management procedures and techniques contributing to a further enhancement of the efficiency of urban systems and related environmental quality conditions.

Urban energy planning is a field where reluctance to an integrated planning of sustainability can be overcome when it is sufficiently demonstrated that solutions are technically feasible and economically **meaningful**. Rational arguments • taking into consideration the market situation and the technology potential • may then act as convincing vehicles for removing institutional obstacles for urban energy and environmental planning.

Particularly in urban transport **planning, the need** for an integrated planning approach has been **recognised** by many researchers. Accordingly, an emphasis is put on the necessity to integrate land use planning with transport infrastructure planning, but also with behavioral policies (Banister and Watson, 1994; Owens, 1992). Recently, in various European countries the concept of the compact city has been adopted by politicians and planners as a major solution to the problem of increased commuting and traffic by private car. There are two arguments in favour of compact cities. In these cities first, the density of living houses is relatively high and secondly, new employment sites are concentrated along a small number of **rail(way)** stations. Concomitantly, compact cities are conceived of as city models that advance short travel distances and increase the use of public transport, leading to a higher level of sustainability (Fourth Report Extra, 1991; Van Wee, 1993).

Despite the above mentioned consensus, various critics can be observed. It is not yet sufficiently clear whether the basic assumptions underlying the compact city are appropriate, for example, in view of the **socio-economic** composition of cities and

their interdependent activity spaces (**Banister** and Watson, 1994; **Breheny**, 1994; Van **Geenhuizen** et al., 1994). Thus, urban transport planning is a good example of the high complexity and interrelatedness of different planning fields, and concomitant impediments to success.

Regarding the above **experiences** and ongoing policy implementation, it is very desirable that knowledge on success but also **failures** are transferred to other cities. By means of networks of European and World cities, information on promising policy actions can be further distributed to a broad set of cities and actors. Networks of various cities can also be used for cross-national comparative research on the impacts of measures and on critical success factors in the implementation of new concepts and policies. This asks for a common research methodology and once more, for the design of urban data-bases in a **standardized** way.

In conclusion, cities may play a catalyst role in rationalizing environmental policy. Such a role is beneficial for both our planet as a whole and for the individual cities in particular. Although many threats can be **identified** aside from the social dilemma, various opportunities seem to guarantee a move into the right direction of sustainable cities.

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